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Simple apparatus and temperature classifications in hazardous areas

Further to the e-training document "Zoning, methods of protection and equipment marking in hazardous areas", we now examine two specific aspects of ATEX certification that can cause confusion; simple apparatus and temperature classifications.

ATEX: Simple Apparatus

K Controls have made the decision to fully certify switchboxes to the new mandatory ATEX standards and not simply rely on the use of certified components e.g. proximity switches or simple apparatus such as mechanical micro switches. In this document we explain the thinking behind this decision.

Simple apparatus is defined in clause 5.4 of BS EN 50020:2002- 'Electrical apparatus for potentially explosive atmospheres - Intrinsic safety 'i'. BS EN 50020 will at some point be replaced by BS EN 60079 - 11 which has yet to be published. This is the BS equivalent of IEC 60079-11 which has a further clause requiring compliance with Category 1 standards.

Simple apparatus was discussed at the ATEX Standing Committee held on the 6th & 7th February 2003. The following is as a result of that discussion.

1) "Simple Apparatus" as defined in the European harmonised standards for electrical equipment intended for use in potentially explosive atmospheres are excluded from the Directive, as they have no own source of ignition. Therefore, they do not have to meet the relevant Essential Health and Safety Requirements or be subject to the conformity assessment procedures under Directive 94/9/EC.
2) This equipment shall not be marked in conformity with the ATEX directive.
3) The identification of such equipment is part of the manufacturer's ignition risk assessment.

To satisfy the final point regarding risk assessment, the manufacturer has to consider not only the device, be it a switch, resistor or simple semi-conductor, but also whether the enclosure into which the components are mounted conforms to the requirement of EN 50014 and EN 50020. This same risk assessment also applies to switchboxes that contain ATEX certified components such as proximity switches.

In assessing these risks the following points have to be considered. There may be others.

1) How does the manufacturer satisfy the requirement of clause 7 EN 50014 for non-metallic enclosures or parts of enclosures? In particular, controlling the buildup of electro-static charge on plastic parts which are likely to be rubbed or cleaned in service. I.e. clear plastic visual position indicators. How is the surface resistivity or insulation resistance requirement for plastic enclosures met?

2) For group II electrical apparatus, manufactured in light alloy, is the level of magnesium controlled in accordance with 8.1 of EN 50014?

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3) To satisfy the creepage and clearance requirements of clauses 6.3 and 6.4 of EN 50020 has consideration been given to the insulation thickness on switch leads? Is there more than one switch in the enclosure and if so is there sufficient segregation between circuits? Is there provision to back wire a remote mounted intrinsically safe device such as a solenoid? If so, again, is there sufficient clearance between circuits? Do the terminals meet the requirements of Table 4 in EN 50020? Are the terminals clearly marked and supported by an internal wiring diagram?

4) Is it clear to the installer and user what the safety parameters are? Ui, Ii, Pi, Ci, and Li? (Voltage, current, power, capacitance and inductance).

5) Has the necessary voltage test to earth been performed for each circuit within the enclosure?

6) Does the equipment carry a traceable plant identification label?

7) For the purposes of plant audit can the user easily access the necessary documentation to perform a risk assessment as required by the ATEX user directive?

8) Does the IOM clearly state that the product should not be modified by the user? Such action could invalidate the approval of the product and render it unsafe for use.

All these questions have to be addressed by the manufacturer when designing and manufacturing electrical equipment housing simple apparatus or certified components. Having the design assessed by a Notified Body and an EC Type Examination Certificate issued provides piece of mind not only for the user but also for the manufacturer. Manufacturing the product under an ATEX Quality Notification brings the added assurance that all processes involved in the supply of the product, such as contract review, purchasing, manufacturing, inspection and test, calibration, document control and record keeping are controlled.

It is clear that the initial investment in certification and the ongoing maintenance of quality system is costly but it is our belief that certifying equipment containing 'simple apparatus' is in everyone's interest.

ATEX: Temperature Classifications

We are sometimes asked why the maximum surface temperature of a device defined by its “T” rating exceeds the maximum ambient operating temperature (T amb).

For example a product may be certified ATEX 11 2 GD Exd IIB T4/135 degrees C (Tamb -20 to +80 degrees C). There is a relationship between the “T” rating of a product and the ambient temperature but it is important to note that the user is not at liberty to deviate from the maximum ambient temperature mentioned in the certificate and noted on the certification label.

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The “T” rating of a product (e.g. T4/135 degrees C) defines the maximum surface temperature of the device. The gas auto ignition temperature or the dust ignition temperature must be above the "T" rating of the equipment.

The “T” rating considers the sum of the defined maximum ambient temperature (T amb max), (assumed to be +40C unless otherwise stated) and the maximum temperature rise of the device when fully powered or under fault conditions (T rise).

T amb max + T rise + a factor of safety determined by the certifying body must be less than the permitted T rating of the product.

Example: T amb max 80 degrees C + T rise 45 degrees C = 125 degrees C. This is more than the T5 / T100 degree C rating but less than the T4 / T135 degree C rating, therefore, subject to the factor of safety applied by the certifying authority, the product is likely to be certified T4/T135 degrees C.

In this example it is not possible to supply the product as say T5 / T100 degrees C simply because the T amb max is only say 50 degrees C. The certificate and the certification label define the T rating and the T amb max, **no interpretation is permitted.** If in doubt please contact K Controls.